DOCUMENT RESUME

ED 196 535 PS 011 887

AUTHOR Pellegrini, A. D.: Greene, Helen
TITLE The Use of a Sequenced Questioning Paradigm to Facilitate Associative Fluency in Preschoolers.
PUB DATE Sep 80
NOTE 26p.: Paper presented at the Annual Convention of the American Psychological Association (88th, Montreal, Quebec, Canada, Setember 1-5, 1980). Best copy available.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Association (Psychology): Comparative Analysis: *Creativity: Object Manipulation: *Play: *Preschool Children: Preschool Education: *Questioning Techniques: Stimuli

ABSTRACT

The extent to which free play versus sequenced questioning conditions facilitates preschoolers' associative fluency was investigated in this study. Twenty-four children (12 boys and 12 girls, with a mean age of 50.7 months) were randomly assigned to one of three conditions: free play, sequenced questioning, and control. In the sequenced questioning condition, children presented with stimulus objects (an empty wooden spool, a blue pipe cleaner, a wooden clothespin, and wine bottle cork) were asked to describe, classify, and contrast them. Children in the free play conditions were presented simultaneously with two of the objects and were instructed to play with them in any way they liked. While children in the first two conditions were interacting with the objects, the control children engaged in conversation with the experimenter for ten minutes and then were asked, with the rest of the children, for novel uses of one of the objects. In general, children in the sequenced questioning condition generated significantly more novel responses than children in the other two conditions. No significant difference was observed between the play and control conditions. It was suggested that the sequenced questioning technique can be an effective teaching strategy in preschool classrooms for facilitating children's creative and cognitive development. (Author/MP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED196535

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

The use of a sequenced questioning paradigm to facilitate associative fluency in preschoolers.*

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

A.D. Pellegrini

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

A.D. Pellegrini, Ph.D.
Early Childhood Education
University of Georgia

Helen Greene, Ph.D.
Child Development Center
University of Rhode Island

Running head: Sequenced questions

*We would like to thank Dr. R. Pecheone of U.R.I. for his help with the data analysis and Drs. L. Galda, K. Osborn, F. Reisman, and C. Smock of U.G.A. for their supportive and thought provoking comments at various stages of the project.

PS 01 1887

FILMED FROM
BEST COPY AVAILABLE

Abstract

The use of a sequenced questioning paradigm to facilitate associative fluency in preschoolers.

The intent of the study was to investigate the extent to which free play vs. sequenced questioning conditions facilitated preschoolers' associative fluency. Twenty-four children (12 boys and 12 girls, $\bar{x}$ age of 50.7 months) were randomly assigned to one of three conditions: free play, open questions, control. In the first two conditions children interacted with randomly chosen conventional objects. Children in all conditions were asked for novel uses for the conventional objects. Children in the sequenced questioning condition generated significantly more novel responses than children in the other two conditions ($p < .002$). No significant difference was observed between the plan and control conditions. Implications for pedagogy are discussed.

The intent of this study was to investigate experimentally the extent to which a play condition vs. a sequenced questioning paradigm facilitated preschooler's ability to generate novel uses for conventional objects. Using a pencil as a play cigar is an example of a novel use for a conventional object. Associative fluency is the measure of one's ability to generate novel uses for conventional objects.

Two treatments for facilitating preschoolers' associative fluency were examined in this study: a play condition and a sequenced questioning condition. It will be argued here that the latter condition was the more effective facilitator of associative fluency because it enabled children to conceive of conventional objects as multidimensional entitees, i.e., simultaneously possessing more than one attribute and belonging to more than one category.

Recent research has shown that play, i.e., where a child freely manipulates objects around a self-imposed play theme, can be an effective facilitator of creative responsives for preschool children (Dansky & Silverman, 1973, 1975). It has been hypothesized (Sutton-Smith, 1967) that the relaxed atmosphere which prevails in play episodes enables preschool players to explore freely the many attributes of play objects. Attributes of an object were defined as aspects of that object's quality, e.g., color, shape, texture, function. Play themes with an object were often based on a specific attribute of that object. For example, the cylindrical shape of a thread spool could result in its being used as a drinking cup in a play episode. As a result of using an object in many play episodes, children usually developed a number

of associations for the object; the associations were often based on the object's attributes (Sutton-Smith, 1967). These associations for an object's attributes seemed to be a source of children's novel responses.

Sutton-Smith argued that play afforded children the opportunity to explore the many dimensions of an object. Fantasy themes which were typically inherent in play episodes, encouraged children to use the objects in novel ways.

Experimental studies conducted by Dansky and Silverman (1973, 1975) corroborated Sutton-Smith's hypotheses. Preschoolers who played with conventional objects generated more novel uses for the objects than children who imitated an adult's actions on the objects. Dansky and Silverman (1973) were admittedly uncertain as to the reason for the play condition being the more effective facilitator. They did observe, however, that the novel uses suggested for objects were often related to the specific uses made of the objects in the play condition. For example, a suggested use for a match box was to use it for a house. During play the same child was observed using the match box as a house. They hypothesized that associative fluency may have been related to the physical attributes of the objects. Note that in the Dansky and Silverman studies only those children in the play condition actively interacted with the objects. The other condition had children imitating an adult's actions; children's ability to freely explore objects was thereby limited in this condition.

Inherent in preschoolers' play may be factors that limit the exploration of the many attributes of conventional objects.

When preschoolers play with an object they often use only one dimension of that object as a basis for a play episode, e.g., a thread spool's ability to roll may mean it is only used as a car in a play episode. When a child's play theme is based on one attribute of an object his/her exploration of the other dimensions of that object is thereby limited. This phenomenon of centering a play episode on only one attribute of an object may limit generation of assoicative fluency if, as Sutton-Smith stated, associative fluencey is related to one's ability to explore attributes of an object.

Play is not, however, the only means by which preschoolers can actively discover the many attributes of objects. Sigel (nd, 1979) has developed a sequenced questioning paradigm that also views preschoolers as active learners, constructing their own knowledge. In this model an adult, usually a teacher, engages a child in a structured question/answer sequence. In that sequence, the teacher first asks the child to describe objects (descriptive questions). After objects are thoroughly described, children are asked to note differences between described objects and then similarities between the same objects (contrasting questions). By answering this sequence of questions children are actively hypothesizing about the objects; they are not merely choosing answers from a list of teacher provided responses.

Sigel (1979) stated that by posing questions to a child, a teacher can raise a conceptual conflict, or disequilibrium (Piaget, 1970), within the child. Questions make children aware of a conflict between their present conceptual state and a desired state. Because human beings, according to Piaget (1970), are genetically predisposed to

reduce conceptual conflict, i.e., seek equilibration, they will attempt to answer the questions which caused the conflict. Successfully answering the question in-turn facilitates concept development. An example of this process could have a child with a concept of a pipe cleaner as a unidimensional blue object. When the teacher poses a descriptive question to a child which asks him/her to consider another dimension of the object, the child's concept of the object will be in disequilibrium. After the child generates another descriptor of the object, equilibration will have been temporarily re-established. The child's concept of pipe cleaner is thereby enriched because he/she now sees it as simultaneously possessing more attributes. Thus, a structured questioning sequence designed to raise conceptual conflict can be an effective facilitator of development. Children exposed to such a paradigm attempt to resolve conceptual conflict which in-turn results in conceptual growth vis-a-vis the object being examined.

The general intent of the structured sequence of questions used in this study was to stimulate children's explorations of the multi-dimensionality of conventional objects. Each type of question, however, was designed to have differential effects. That is, descriptive questions were asked first to enable the child to recognize that one object simultaneously possesses many attributes. Being asked and successfully answering descriptive questions should result in conceptual conflict, resolution and concept development. Answering this sequence of questions facilitates concept development because children can, after answering questions, conceive of objects as simultaneously possessing many attributes; before this time they typically centered an only one

aspect of an object.

Answering contrastive questions should result in conceptual conflict and development of a different kind for preschoolers. Contrastive questions encourage the child to see the object as a member of many conceptual categories, e.g., a matchbox can simultaneously belong to a class of wooden objects and to a class of rectangular objects. Thus a child answering contrastive questions comes to realize that one object can belong to many categories. The attributes generated while answering descriptive questions serve as bases for answers to contrastive questions. Answering descriptive and contrastive questions enables the child to comprehend the multidimensional of objects.

Recognizing the multidimensionality of objects should facilitate associative fluency for two reasons. First, associative fluency is thought to be related to one's ability to recognize attributes of objects. Secondly, conceiving of objects as members of broader categories allows children to draw upon other objects in the same categories for potential uses.

In this study we examined which condition, play or sequenced questioning, was the more effective facilitator of associative fluency in preschool children.

Method

Subjects

The twenty-four children involved in this study all attended a university preschool and were from middle and upper-middle class backgrounds. The sample of twenty-four participants, matched for sex, was randomly chosen from the preschool population of seventeen girls and fourteen boys whose parents consented to their participation in

the study. The sample of twelve boys and twelve girls ranged in age from forty-two to sixty-seven months ($\bar{x}$ = 50.7).

(Insert Table 1 here)

From this sample of twenty-four, eight children were randomly assigned one of three experimental groups: play, sequenced questions, or control.

Materials

The materials consisted of an empty wooden thread spool, a blue pipe cleaner, a wooden clothespin, and a wine bottle cork. In both play and sequenced questioning conditions children saw a total of two stimulus objects. Experimenters and children sat at child-sized furniture in the conference room of the Child Center. Children's responses were recorded on a Sony Secuture portable dictating machine.

Procedure

A randomized postest only control group design was used (Campbell & Stanley, 1963).

One male and one female experimenter alternated roles interviewing the children. Each child, in the course of his/her regular free play time, was approached by an experimenter who said: We would like you to play some games and talk with us in the conference room. Come and join us. The experimenter accompanying the subject into the room sat at the table with the other experimenter; the latter interviewed the child. In the first part of each session the experimenter attempted to make each child feel comfortable in the experimental situation through a number of informal converstaion means. Experimenters' roles with each child were randomly counterbalanced.

In the sequenced questioning condition, the experimenter said to the children: I'm going to give you some things to play with and I'd

like to ask you some questions while you are playing with them. Children in this condition were given one stimulus object at a time, for a total of two objects. Presentation of individual stimulus objects was randomly counterbalanced. They were told they could handle the object as they talked about it. Following Sigel's (nd) recommendation, children in this condition were first asked descriptive questions about the article: What does it look/feel like? What do you think it is? What else could it be? Answers to descriptive questions were followed by clarification questions, e.g., Tell me more about that. What do you mean? After each child described two stimulus objects, the experimenter asked contrasting questions. First, they were asked difference questions about the two objects described, e.g., How are these two things different? And then similarity questions, e.g., How are these things like each other? How are they the same? Experimenters also asked clarification questions after each contrasting question. The question period lasted ten minutes for each child. All children in this condition responded appropriately to the questions.

Following Dansky and Silverman's (1973) procedure, children in the play condition were presented simultaneously with two randomly selected stimulus objects and told: Here are two things I'd like you to play with. You can play with them in any way you'd like. We'll talk about them in a few minutes. Generally, all children in this conditon become immediately involved in play with the objects. All children played for a full ten minutes. Types of play exhibited were functional play (physical manipulation of objects), constructive play, (building

with objects), fantasy play (make-believe play with objects), and combinations thereof.

The control children engaged in conversation with the experimenter for ten minutes; they saw no stimulus objects at this time. Experimenters talked to control subjects about topics such as school, T.V., baseball, and their favorite activities. After this ten minute conversation control children were exposed to the dependent measure.

The Dependent Measure

Immediately following the sequenced question, play, or control conditions, each subject was given an alternative-use test by the same experimenter with whom they interacted in their assigned condition. Children in the sequenced question and play conditions were presented with one of their two experimental stimulus objects. Children in the control condition were presented with one stimulus article selected from the total array of four objects. In all conditions choice of a stimulus object for the dependent measure was randomly selected.

In presenting each student with the stimulus object the experimenter said, You can use this _____ in lots of ways. Tell me how you can use it? How can you play with it? No time limit was imposed on this part of the session. All subjects' utterances were audiotaped during the experimental sessions. Tapes were transcribed by the first author and coded on the same day on which they were recorded. Utterances were coded as standard (ST) when children suggested using the stimulus object in the way(s) it was intented to be used, e.g., for the spool--to hold thread; for the cork -- to put

in a bottle. All other uses, i.e., nonconventional uses, were coded as creative (CR) No differentiation was made within the class of nonconventional responses. Interrater agreement on the coding of the uses for the objects ranged from 95% to 99%.

Results

Generally, it was found that the sequenced questioning condition was the most effective facilitator of associative fluency. No condition differences were observed for the generation of standard responses.

Frequencies of creative and conventional responses for each condition are summarized in Table 2.

(Insert Table 2 here)

Children in the sequenced questioning condition generated most creative and conventional responses, sixty-one and seven, respectively; the play group generated twenty-three creative and four conventional responses; the control group generated eight creative and six conventional responses.

Children's responses to the open questioning condition are summarized in Table 3.

(Insert Table 3 here)

Responses to descriptive questions (98) outnumbered responses to difference (39), and similarity questions (12). Responses to descriptive questions, including such questions as What else could it be? were descriptions of the articles' attributes, e.g., It looks like wood; It's hard. In a few cases children gave synonyms for labels they had

previously given, e.g., spool, sewing thing.

Separate analyses of variance were performed on children's standard and creative responses to the stimulus objects. Analyses showed that the play, sequenced questioning and control conditions did not differ significantly on the number of standard responses generated ($F=.961$, $df=2/31$, $p < .39$). However, there was a significant condition effect on the number of creative responses generated ($F=13.608$, $df=2/21$, $p < .002$).

(Insert Table 4 here)

Post hoc comparisons using Scheffe's test showed a significant difference between the mean of the sequenced questioning condition and the means of both play and control conditions ($p < .05$). No significant difference was observed between the means of the play and control conditions.

(Insert Figure 1)

The following analyses were performed to examine the extent to which the sequenced questioning paradigm interacted with other factors. With age used as a covariate, no significant interaction was observed between condition and object ($F=.117$, $df=4$, $p < .974$) (see table 5) or between condition and sex ($F= .819$, $df=2$, $p < .458$) (see table 6).

(Insert Table 5 and Table 6)

Discussion

This study examined the extent to which two pedagogical strategies facilitated associative fluency in preschool children. Both the play and sequenced questioning strategies assumed preschoolers were

active learners. Development was thought to be optimumly facilitated when children were allowed to freely interact, motorically and linguistically, with their environments, i.e., children construct knowledge, they do not passively absorb it. Results from this study indicate that sequenced questioning was the more effective facilitator of associative fluency.

The novel responses generated by the children in each of the conditions seemed to be closely related to the physical attributes of the stimulus objects. For example, children suggested using the thread spool as a wagon wheel, a trash can, and a bottle cork; all these uses were related to the attribute roundness. Dansky and Silverman (1973) also found that children's responses were related to the objects' attributes. This observation suggests that associative fluency most probably is related to one's ability to discover attributes of conventional objects. Thus, both play themes and symbolic associations may be derived from the discovery of objects' attributes (Sutton-Smith, 1967).

Although play facilitated the building up of associations for the objects, these associations may have been limited by the number of play themes actually engaged in by the children. For example, through free play a child may have discovered that an object rolls. This one attribute may have been the basis of an entire play episode and consequently other attributes of the object remained unexplored. The sequenced questioning condition, on the other hand, promoted the child's attention to a wider array of the object's attributes. The descriptive questions demanded that the child examine and verbally encode more than one attribute of an object. The contrasting questions

helped the child use these attributes to place the object in a number of conceptual categories. Thus, sequenced questions may have broken-up children's unidimensional concepts of objects.

Preschoolers' propensity to conceive of objects as unidimensional, i.e., to center on one aspect of an object, has been well documented (Piaget, 1970). Piaget's (1970) observations of children in class inclusion experiments suggested that they could not conceive of objects as simultaneously belonging to more than one class. Centering on one dimension of an object during a play episode may limit the extent to which children explore other attributes of the object. The child's symbolic associations for the object may then be limited to the attribute(s) he/she centered on. As the child becomes aware of the multidimensionality of objects his/her symbolic associations for the objects should increase.

The sequenced questioning condition had an experimenter posing descriptive questions to a child so as to enable him/her to recognize as many dimensions of the object as possible. Under this condition the child identified many attributes of the objects; he/she was not merely repeating verbal descriptors provided by the adult. The adult's role was to move the child through many of the perceptually available attributes of the article and to help him/her clarify these observations. For example, in asking, <u>How does it feel</u>? <u>What does it look like</u>? the questioner does not dwell upon only one dimension of the object and consequently helps the child thoroughly explore the object. Verbally encoding attributes also helps the child remember the attributes for a longer time; they can then be more readily retrieved and used at a later

time (Rohwer, 1970; Buium & Turnure, 1977). Thus, the function of the descriptive questions was to help the child recognize and verbally encode as many of an object's attributes as possible.

Posing contrasting questions about objects to children, according to Sigel (1979), helps them assimilate these objects and their attributes into already established congitive schema and thereby enrich those schema. For example, if a child notes that the cork and the spool both roll, he/she enriches his/her already existent schema of things which roll by adding those attributes which are unique to the cork and the spool. The child's existing concept of things which roll may consist of rubber balls. By comprehending that corks and spools also roll the child's concept of things which roll is thereby enriched, or broadened, because he/she now realizes that the ability to roll is a trait not limited to balls. By assimilating the spool and the cork into the already existent schema, the child's concept of cork and spool are also enriched by becoming part of the broader class of rolling objects. A cork, for example, may now be used in play episodes which previously only employed balls.

A rival explanation for our results could state that the questioning sequence did not help children conceptualized of objects as multidimensional but merely elicited direct practice in associative fluency, particularly when descriptive questions like What else could it be were asked. This particular descriptive question was not unlike the criterion phase questions used to elicit associative fluency. However, when the thirty-two responses to this question were examined, one

found that most of the responses (30:32) were standard labels, not creative responses. This result suggests that the contrastive questions, which intervened between descriptive and criterion questions, may have been primarily responsible for facilitating associative fluency. That is, during the descriptive question phase children were asked questions not unlike criterion phase questions. These descriptive questions did not elicit creative responses. Answering contrastive questions, which followed descriptive and preceded criterion questions, may have facilitated associative fluency because they enabled children to see the stimulus objects as part of broader classes of objects. When a child sees an object as belonging to broader classes of objects, he/she no longer must depend solely on the immediately available object to generate uses. That is, the child can generate uses for a physically present object based on other objects possessing similar attributes which are members of the same conceptual categories, as well as the immediately available stimulus. The child then, is drawing upon physically present objects as well as objects which are psychologically present, i.e., objects which he/she remembers as belonging to similar conceptual categories. Consequently children in the sequenced questioning condition appeared to generate more novel uses because they drew upon many objects in different categories, not just one physically present object.

It appears as though the sequenced questioning technique would be an effective teaching strategy in the preschool classroom. It seems capable of facilitating both creative and cognitive development. The technique was equally effective with both boys and girls and with a

variety of stimulus objects, as evidenced by the lack of statistical interaction between condition and sex and condition and object. Similarly, the age of the child did not seem to significantly effect the technique.

To implement an open questioning strategy in a classroom it is imperative that the teacher view the child as an active learner. That is, children should be encouraged to manipulate objects and talk about their manipulations. They should be encouraged to hypothesize about relationships between objects without being overly concerned about arriving at one right answer. The inquiry and hypothesizing processes are more important than a correct answer.

Techniques similar to this sequenced questioning paradigm are currently being used in one of the Follow Through Models, the Mathemasenic Activities Program (MAP). The MAP advocated a constructionist theory of knowledge (Smock, 1976) whereby children's activity, self-regulation, and striving toward equilibration are seen as essential conditions for cognitive development.

References

Buium, N., Turnure, J.E. A cross-cultural study of verbal elaboration productivity and memory in young children. Child Development, 1977, 51, 296-300.

Campbell, D., & Stanley, J. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally, 1907.

Dansky, J.L., & Silverman, I.W. Effects of play on associative fluency in preschool-aged children. Developmental Psychology, 1973, 9, 38-43.

_____. Play: A general facilitator of associative fluency. Developmental Psychology, 1975, 11, 104.

Piaget, J. Piaget's Theory In P.H. Mussen (ed): Carmichael's Manual of Child Psychology, (Vol. 1). (3rd ed.). New York: Wiley, 1970.

Rohwer, W.D. Implications of cognitive development for education. In P.H. Mussen (ed.). Carmichael's Manual of Child Psychology, (Vol. 1). (3rd ed.). New York: Wiley, 1970.

Sigel, I.E. Publication #113 of the Social Science Education Consortium, Boulder, Colorado: University of Colorado, no date.

Sigel, I.E. On becoming a thinker: A psychoeducational model. Educational Psychologist, 1979, 14, 70-78.

Smock, C. A constructionist model for instruction. Follow Through Research Report, 19. Athens, Georgia: University of Georgia, 1976.

Sutton-Smith, B. The role of play in cognitive development. Young Children, 1967, 22, 361-370.

TABLE 1

Children by sex by age

	N[a]	Age Range[b]	$\bar{X}$ Age[b]
Boys	12	42-66	49.0
Girls	12	43-67	52.5
Total	24	42-67	50.7

a Number of children

b Age expressed in months

Table 2

Frequencies of Creative and Conventional Responses by Condition

	Creative	Conventional	Total
Questions	61	7	68
Play	23	4	27
Control	8	6	14

Table 3

Frequencies of Responses to Descriptive and Contrasting Questions by Child

Child	1	2	3	4	5	6	7	8	Total
Descriptive	9	12	18	10	9	21	8	11	98
Difference	4	6	5	4	4	8	3	5	39
Similarity	1	1	2	1	3	2	1	1	12

TABLE 4

One-way ANOVA Summaries for Condition Effects on the Dependent Measures

	df	SS	MS	F	p
CR[a]					
Between groups	2	133.0	66.5	13.608	.002
Within groups	21	102.6249	4.886		
Total	23	235.6249			
ST[b]					
Between groups	2	.5833	.2917	.961	.3988
Within groups	21	6.3750	.3039		
Total	23	6.9583			

[a] creative responses

[b] standard response

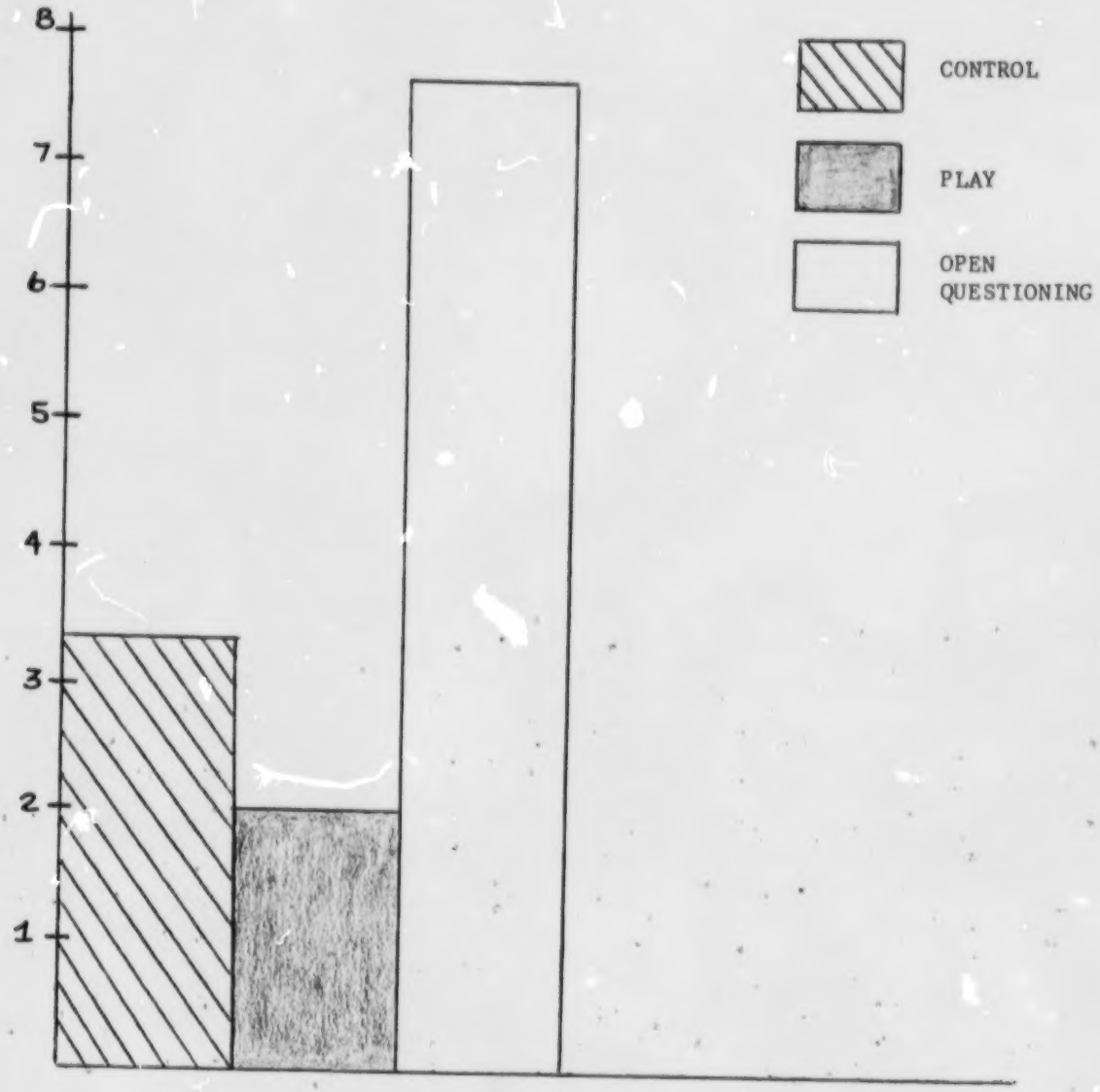

Figure 1. Mean number of creative responses for control, play, and open questioning conditions.

TABLE 5

Analysis of Variance Summary Table for Associative Fluency as a Function of Condition and Stimulus Objects with Age as a Covariate

Source of Variation	df	SS	MS	F	P
Covariate					
age	1	.601	.601	.129	.725
Main effects	5	184.493	36.899	7.920	.001
Condition (A)	2	166.615	83.307	17.882	.0001
Objects (B)	3	7.010	2.337	.502	.688
A x B	4	2.177	.544	.117	.974
Residual	13	60.563	4.659		
Total	23	247.833	10.775		

TABLE 6

Analysis of Variance Summary Table for Associative Fluency as a Function of of Condition and Sex with Age as a Covariate

Source of Variation	df	SS	MS	F	p
Covariate					
age	1	.601	.601	.161	.693
Main effects	3	177.799	59.266	15.908	.0001
Condition (A)	2	152.845	76.422	20.513	.0001
Sex (C)	1	.316	.316	.085	.774
A x C	2	6.099	3.049	.819	.458
Residual	17	63.335	3.726		
Total	23	247.833	10.775		